

NAVAL MEDICAL RESEARCH AND DEVELOPMENT NEWS

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Navy Medicine, Singapore Discuss Collaborative Research

By Capt. Dora Lockwood, U.S. Navy Bureau of Medicine and Surgery

SINGAPORE (NNS) -- U.S. Navy Surgeon General completed a visit to Singapore Armed Forces (SAF) Medical Corps headquarters located at the Singapore Naval Base, Feb. 25.

Vice Adm. Matthew L. Nathan, Navy Surgeon General and Chief, Bureau of Medicine and Surgery, met with Rear Adm. Kang Wee Lee, SAF Chief Medical Corps and several senior SAF medical officers to discuss advances in military medicine, ongoing research efforts and the strategic value of medical partnerships.

Kang and his team of medical leaders provided an overview of SAF medical corps and an informative brief of recent medical studies and ongoing research initiatives, some of which include collaboration with U.S. Navy personnel from the Naval Medical Research Center-Asia (NMRC-Asia).

Nathan expressed his gratitude to the group for their collaboration with NMRC-Asia.

"I am always grateful of the relationship we share," said Nathan. "I'm very appreciative of the opportunity to learn from you and to partner with you in an effort to make a difference, not only for our warfighters, but also for the people of the world."

The leaders also discussed the operational impacts on the warfighters' ability to conduct their mission if plagued by infectious disease, such as malaria or dengue fever, and the strategic importance to advance medicine to prevent these diseases.

"We must continue to work together and share in real-time what we are learning,"

said Nathan. "I see passion and excitement about science in our researchers to explore new and better ways to find cures for these very dangerous and emerging diseases."

Kang also spoke of the importance of developing personal, lasting relationships through military-to-military engagements, exercises and training.

"I have had the opportunity in my career to work with the U.S. Navy," said Kang. "Those partnerships are the highlight of my career."

Nathan reiterated his appreciation and commitment to build on these relationships.

"As the surgeon general of the Navy, I'm very proud to meet you and personally thank you for allowing us to work with your incredibly talented and professional staff," said Nathan. "I see a true partnership here."

NMRC-Asia, located in Singapore, conducts biomedical research to prevent, mitigate and control infectious diseases of military relevance in Southeast Asia. NMRC-Asia researchers partner with regional governments, international health organizations and U.S. government agencies to build capacity, conduct surveillance and scientific investigations of infectious diseases.

U.S. Navy Medicine is a global health care network of 63,000 Navy medical personnel around the world who provide high quality health care to more than one million eligible beneficiaries. Navy Medicine personnel deploy with Sailors and Marines worldwide, providing critical mission support aboard ship, in the air, under the sea and on the battlefield.

NMRC Commanding Officer's Message

March comes in like a lion and goes out like a lamb. After an unusually snowy winter here in the D.C. area, that caused regular disruption in our work flow and stymied planning sessions, we are anxiously anticipating the change of season so we can get back to the routine flow of the business of R&D. I recently found this quote from Terri Guillemets, "Weather is a great metaphor for life – sometimes it's good, sometimes it's bad, and there's nothing much you can do about it but carry an umbrella." And then I would add, Let's wait for Spring and see what it brings. With sequestration, furloughs, travel restrictions, repeat budget cut drills, lots of rumors about how exactly we'll function under the Defense Health Agency (DHA), and BUMED's re-invention process and discussions, it has seemed like a long, disrupted winter for R&D as well. Today it is sunny and 71 degrees and it seems like Spring; but, it looks like another cold wave may drop the temps again and there may be a few more surprises before Spring really arrives in earnest. Likewise, we hear there is progress in the development of the new organizational structure under DHA and we are optimistic that there will also be organizational changes at BUMED and within NMRC that build on those changes to provide better service throughout Navy Medicine, but plans are still being interrupted by the occasional organizational snow storm. Please don't grow too frustrated though. The days are growing longer, the sun is getting warmer, and soon flowers will begin to bloom. Committees are continuing to meet, plans are being reviewed, and nominations are being processed. In the meantime, as is evident again throughout this newsletter, each of the labs is continuing to do tremendous work. Your successes are exciting and measureable. I thank you for that and ask your continued patience with us. I fully expect that the changes coming will enhance our organization and facilitate your fantastic efforts.



NMRC Commanding Officer sends,
John. W. Sanders III, CAPT, MC, USN

NAMRU-6 Commanding Officer's Message

For my first message since taking command of U.S. Naval Medical Research Unit No. 6 (NAMRU-6) Peru, I'd like to tell a story about the value of attending scientific conferences and collaborations. Having a steady supply of malaria infected mosquitoes is crucial to the Navy's malaria vaccine effort. In the fall of 2012, while wandering the poster sessions at the annual meeting of the American Society of Tropical Medicine and Hygiene, Dr. Gisella Vasquez Ph.D., a NAMRU-6 entomologist met Dr. Cuauhtemoc Villarreal Trevino from the Mexican National Institute of Health. A man I'll simply call the mosquito whisperer.

These two stellar Latin American scientists spent hours at the meeting discussing *Anopheles darlingii* biology, the primary vector of malaria in the Amazon and an insect that had not been reared in captivity in over 30 years of trying. Dr. Villarreal had been employing methods in his lab with a different Anophelene species and that method might be applicable to NAMRU-6's problem of raising *A. darlingii* to make infected sporozoites. A fruitful collaboration was born and Dr. Villarreal was soon visiting NAMRU-6 to work on the problem. He spent hundreds of hours in the insectary teaching NAMRU-6 technicians and building a critically new capacity in the country.



Today, I'm very proud to say NAMRU-6 has THE WORLD'S ONLY *Anopheles darlingii* colony. This is a critical step in Navy research on malaria and will be an invaluable resource to the scientific community. This is just one more great example of the importance of scientific collaboration in achieving Navy Medicine's mission and how attendance at international scientific conferences can be key facilitators of significant collaborations. Despite our current fiscal challenges, we must continue to participate in these forums and be world leaders in science.

NAMRU-6 Commanding Officer sends,
Kyle Petersen, CAPT, MC, USN

Happy 143rd Birthday to the Navy Medical Corps

By Vice Adm. Matthew L. Nathan, U.S. Navy Surgeon General, and Chief, U.S. Navy Bureau of Medicine and Surgery

On behalf of Navy Medicine, I extend my sincere thanks and appreciation to the Navy Medical Corps as they celebrate 143 years of dedicated service March 3.

The Medical Corps has come a long way since 1871 when the 41st Congress enacted the Naval Appropriations Act, establishing the Medical Corps as an official Navy Staff Corps.

Whether we look back 100 years, 50 years, or in recent years, we see Navy physicians making a difference to their craft, their patients and to future generations. Their achievements and innovations in naval medicine have made their mark on military and civilian health care across the globe.

Over a hundred years ago, Navy Medicine sought to improve the way patients were transported in close confines aboard ships. Former Navy Surgeon General Charles Stokes answered that call and developed a wire-basket stretcher, which is still in use today.

Fifty years ago, Capt. George Bond pioneered the study of underwater habitats with a project called SEALAB, which helped advance the understanding of the strains our Sailors can endure while undersea.

In more recent history, our Navy physicians pioneered the development of Forward Resuscitative Surgery Systems on the battlefield, saving countless lives and assisting in a survival rate unprecedented to past conflicts.

Our Medical Corps personnel are globally engaged. They provide the highest quality of care to those they serve whether it is on, above or below the sea, at home or overseas in far away lands. They meet the mission — from kinetic warfare, to humanitarian assistance, to research and development — anytime, anywhere.

The Medical Corps continues to pave new frontiers in biomedical research, medical education and training, and patient care delivery at our clinics, hospitals, aboard our afloat platforms, and in combat.



To the thousands of active duty and reserve Medical Corps Officers, I convey my deepest gratitude for your selfless service, your dedication to duty and your sacrifice in order to accomplish the mission and serve those who serve. I am so proud to be your shipmate and it is my honor to serve with you.

Navy Medicine Highlights Commitment to Global Partnerships

By Lt. Cmdr. Dustin J. Harrison, U.S. Naval Medical Research Unit No. 2 Phnom Penh, Cambodia



U.S. Navy Surgeon General (left) Vice Adm. Matthew L. Nathan visiting village with Lon Chan Rasmey, Deputy Director of Kampong Cham Health Department and Malen Ly, NAMRU-2 Phnom Penh Field Supervisor in Kampong Cham, Cambodia.

PHNOM PENH, Cambodia (NNS) -- The U.S. Navy Surgeon General completed a visit to the U.S. Naval Medical Research Unit No. Two - Phnom Penh (NAMRU-2 PP), Cambodia, Feb. 26 to 28.

Vice Adm. Matthew L. Nathan, Navy Surgeon General and Chief, U.S. Navy Bureau of Medicine and Surgery met with NAMRU-2 staff; U.S. Ambassador to Cambodia, William Todd; Director Health Department, Ministry of National Defense, Lt. Gen. Kong Saly; the Cambodia Minister of Health, Mam Bunheng; and others to discuss current and future U.S. government public health partnerships.

Nathan was provided with a detailed overview of current partnerships, projects, and progress in capability and capacity building, and infectious disease

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NHRC in Discussions with Singapore Chief Naval Medical Officer to Expand Research Opportunities

By Anna Hancock, Naval Health Research Center Public Affairs Officer

SAN DIEGO — Collaborative efforts in military operational medicine and research and development were the focus of discussions between Naval Health Research Center (NHRC) leadership and Singapore's Chief Naval Medical Officer who visited NHRC headquarters in San Diego, March 6 and 7.

Singapore's Chief Naval Medical Officer and Commander of the Force Medical Protection Command Col. KC Tang brought a team of senior scientists and epidemiologists to liaison with NHRC's leadership team, medical scientists and research experts. All with a common goal to expand the relationship in support of the protection, health, and readiness of each nation's respective armed forces.

"Our partnership started in 2005 with a mutually beneficial collaboration in respiratory disease surveillance and infectious disease research," said Cmdr. Gary Brice, department head for NHRC's Operation Infectious Diseases Research Department. "Adenovirus and Influenza are our two main focus areas, particularly in the military environment because our populations and the way we train our service members are similar."

For the U.S. armed forces identification or containment of respiratory diseases ensures the health of the service member, reduces the number of training or operational days lost, and can be a cost savings in health care. Across the globe Singapore's national defense research and development organization, DSO, noted

how information sharing with NHRC was extremely beneficial in several of Singapore's wide-scale medical response efforts, including the outbreak of SARS Coronavirus in 2002.

While efforts in these areas will continue, the team hopes to expand the research and development portfolio to include warfighter performance, behavioral health in military members, and medical readiness.

"There will be great value in enteric research, illnesses affecting the intestines, because those types can be the most crippling for our service members in operational environments," said Brice. "Our work in our virtual immersion

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Research Assistant Doug Jones (left), Naval Health Research Center, presents NHRC's studies conducted to support service members using the swim flume (pictured background) to the Singapore delegation during a bi-annual visit to NHRC headquarters to discuss medical research and technology supporting medical readiness for service members.

USUHS Dean Tours Naval Medical Research Center

Story by Mikelle D. Smith, Naval Medical Research Center Public Affairs

SILVER SPRING, Md. – Naval Medical Research Center (NMRC) Commanding Officer, Capt. John Sanders hosted a facilities tour for Dr. Arthur L. Kellermann, Dean of the F. Edward Hébert School of Medicine at the Uniformed Services University of Health Services, March 6.

Upon arrival, Kellermann was greeted by Sanders and five Navy research scientists: Dr. Kevin Porter, Dr. Eileen Villasante, Lt. Cmdr. Maya Williams, Dr. Stephen Ahlers, and Dr. Richard McCarron.

During the tour, Kellermann was shown the progression of work in three different specialty areas; malaria vaccine research, dengue vaccine research, and blast injury research.

“As it relates to malaria research, the Navy is focused on a gene-based vaccine and has done phase one work and challenge in the insectary,” said Villasante, department head for NMRC’s malaria program. “We have come up with 27 percent protection



Naval Medical Research Center (NMRC) Commanding Officer, Capt. John Sanders (right) hosted a facilities tour for Dr. Arthur L. Kellermann, (left) Dean of the F. Edward Hébert School of Medicine at the Uniformed Services University of Health Services, March 6. Photo by Mikelle D. Smith.

and are looking to improve that [percentage].”

Villasante went on to speak about the continued efforts of vaccination exploration in conjunction with Walter Reed Army Institute of Research (WRAIR) as it relates to developing a vaccine to ensure 100 percent protection against malaria.

“This [work] is a combination of WRAIR and NMRC, which is a very coordinated activity,” said Sanders, during the insectary portion of the tour. “There are not that many more malaria vaccine platforms in the world ... these are three of the lead horses in the entire effort [to find a vaccine].”

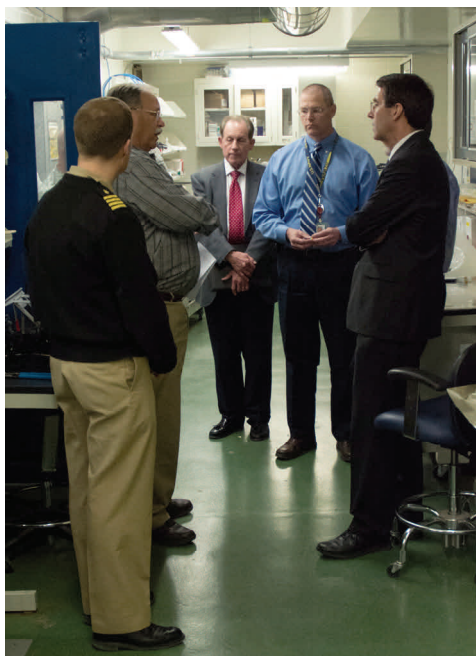
The tour continued with a visit to the facilities blast tube area. In the blast tube area, Kellermann was able to witness a demonstration of the device, which is used to understand the destruction of the body as it relates to investigating effects explosions may cause to service members, such as traumatic brain injuries.

“I hope everyone in this facility periodically takes a look at one another and realizes that they are on the frontlines of tackling some of the greatest killers in the history of mankind,” said Kellermann. “That is exactly what they are doing and I wish them all the best success.”

After the tour, Kellermann expressed his gratitude to Sanders, the research scientists and WRAIR personnel that made it possible.

“Everyone here has a connection to USUHS,” said Kellermann. “Everyone is part of the partnership and we are interested in having more direct involvement. We want to wrap our arms around the most talented people in the military health system as researchers and educators.”

Kellerman, who was recently named Dean of the F. Edward Hébert School of Medicine, will be responsible for overseeing the educational endeavors of more than 640 uniformed medical students and more than 240 military and civilian graduate students.



During the tour, Kellermann was shown the progression of work in three different specialty areas; malaria vaccine research, dengue vaccine research, and blast injury research.

NeuroTrauma Department Seeks to Improve Brain Function

By Dr. Anke Scultetus and Dr. Charles Auker, NMRC NeuroTrauma Department

SILVER SPRING, Md.— The NeuroTrauma Department at the Naval Medical Research Center (NMRC) conducts research on a variety of topics pertinent to the protection, care, and resuscitation of combat casualties, primarily those occurring in austere circumstances with anticipated delay to definitive care.

The Department maintains three major programs. The Blast Research Program consists of human clinical and operational research together with several laboratory model systems. The Operational Medicine Program focuses primarily on emergent militarily relevant issues that could be immediately deployed onto the battlefield. Collaborative efforts with senior trauma surgeons at the Walter Reed National Military Medical Center strengthen the translational value of laboratory evaluations. Research efforts in the Polytraumatics Program are designed to address pre-hospital and early-hospital treatment of combat trauma involving traumatic brain injury (TBI) with and without concomitant injuries (polytrauma) such as hemorrhagic shock (HS), acute respiratory distress syndrome or soft tissue and bone injuries.

For patients with TBI, mortality doubles when hypotension and hypoxemia, hallmarks of severe hemorrhagic shock (HS), occur concurrently. While blood remains the ideal fluid to treat TBI/HS casualties, deployment of blood is logistically costly, complex, requires additional training, and is rarely available in forward combat areas. There is virtually no field-compatible intervention known that improves final outcome. A field-



Dr. Saad Habib Mullah (pictured) and Dr. Biswajit Saha are measuring brain tissue oxygenation using phosphorescence quenching to evaluate the efficacy of blood substitutes in the treatment of traumatic brain injury. Photo by Mikelle D. Smith.

deployable, low-volume, temperature-stable Oxygen Therapeutic (OT) agent that enhances oxygen delivery to the brain may benefit the early (pre-hospital) care of TBI casualties with and without concurrent HS. Such an OT agent could save lives and preserve neurologic function in combat casualties.

The Polytraumatics Program is evaluating seven currently obtainable OTs for their potential to oxygenate brain tissue and reduce neurological damage in laboratory model with and without moderate TBI.

Vasoconstriction, a secondary measurement parameter, has been a major safety concern in older generation oxygen therapeutics, but our initial study in a

laboratory model indicated that a number of these newer OTs have little or no vasoconstricting effects on brain vessels.

It is our goal to investigate whether or not this will translate into a safe and effective drug treatment. Any promising drugs identified in this study will be positioned for further investigation in a more sophisticated TBI laboratory model.

The overall goal of the NeuroTrauma Department is to develop, or support development of, new improved field-capable therapies and regimens of care that will save lives on the battlefield, en route to definitive care, and during early emergency care.

NHRC Discussions

(Continued from page 4)

environments, thermal chamber, or even our specific research about behavioral health may be other opportunities for us to broaden our engagement.”

After the discussions, the group toured NHRC’s laboratories and facilities to learn more about ongoing research projects and

partnerships with military treatment facilities, DoD entities, universities, and industry experts. Before leaving NHRC, the group met with leadership from Navy Medicine West, then held a final meeting to discuss the way forward.

“We both agree that research and development plays a vital role in

readiness,” NHRC’s Commanding Officer Capt. Jacqueline Rychnovsky said.

“Looking back at our relationship, we recognize the value in the joint work we’ve done, and we look forward to expanding our relationship with Col. Tang and his team.”

Cairo Lab Provides Water Borne Diseases Training for Technologists from Lebanon and Egypt

From NAMRU-3 Public Affairs

CAIRO - As an infectious disease reference laboratory supporting the World Health Organization's Eastern Mediterranean Office (EMRO), the U.S. Naval Medical Research Unit No. Three (NAMRU-3) upgraded laboratory diagnostic capacity for water borne diseases in Lebanon and Egypt in response to the Syrian refugee crisis. EMRO provided a list of pathogens they were interested in NAMRU-3 addressing in the training.

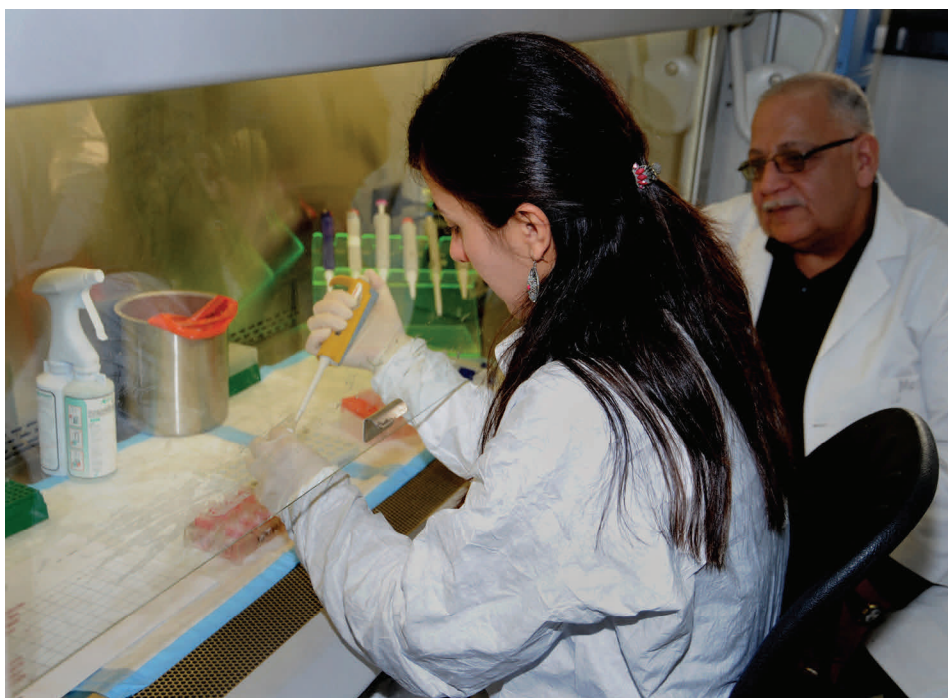
"In addition to the diagnosis of water borne bacteria and viruses, the attendees received training on diagnosis of arboviral infections using molecular and serologic assays. They also attended presentations on specific topics in biosafety including safe handling and transporting of dangerous goods, personal protective equipment (PPE), blood borne pathogens, and emergency response," said Dr. Emad Mohareb, deputy director of NAMRU-3's Research Science Directorate, who planned the training with EMRO.

Because the group was small, NAMRU-3 was able to tailor the training to the needs of the four laboratory technologists as well as provide extensive hands-on work.

Viral and Zoonotic Disease Research Program's (VZDRP) Moustafa Abdel Aziz mentioned the trainees challenged the trainers with excellent questions.

"The trainees should now have a strong scientific background to do the lab diagnostics for the specified agents, which will help them build surveillance projects for those agents," said Aziz.

"Even though the trainees were experienced and competent professionals, they were particularly interested in the biosafety lectures. We used quizzes before and after the training and allowed them to identify biosafety hazards in training materials. The trainees should now be able to assess their labs to know the biosafety level and what PPE should be used," said VZDRP's Sameh Safwat.



NAMRU-3's Mr. Moemen (right) supervises training of a Lebanese laboratory technician on diagnostics for water borne diseases. Photo by Rafi George.

NAMRU-3 Bacterial and Parasitic Disease Research Program (BPDRP) addressed bacteriology and molecular diagnostic techniques in the training.

In the bacteriology unit, the group was trained on the culture and identification of different bacteria, such as *S. typhi*, *V. cholera*, *Neisseria*, *haemophilus influenzae* and *leptospira*.

In the molecular unit, they were trained on DNA extraction, identification of the diarrheagenic *E.coli* and genotyping of *V. cholera*.

"Bacterial isolation and identification is still the 'gold standard' for pathogen testing," said BPDRP's Dr. Atef ElGendy. He also discussed lessons learned from a previous water-borne outbreak in Sudan, where shipping of samples was a major consideration.

"If proper conditions are not maintained, the samples will be not be viable," he added.

BPDRP's Dr. Rania Abdel Khalek and her team of molecular researchers conducted training on molecular diagnostics for the pathogens for the determination of genetically-related strains to identify the source of an outbreak.

"We received excellent reports from all the trainees, who have asked for further collaboration with NAMRU-3 staff, who will hopefully be able to visit their laboratories. We feel confident that if there is a disease outbreak, they now have trained staff to diagnose the different pathogens," said Mohareb.

NAMRU-6 Establishes World's First Colony of *Anopheles darlingi*, the Primary Malaria Vector in the Amazon



The U.S. Naval Medical Research Unit No. Six (NAMRU-6) Entomology Department, led by Cmdr. Frederick Stell, and Dr. Gissella Vasquez, the department's deputy, in collaboration with the National Institute of Public Health of Mexico (INSP), developed an effective method to establish the first-of-its-kind stable *An. darlingi* laboratory colony at the lab's Insectary in Iquitos, Peru.

LIMA, Peru - Malaria is one of the most serious threats to public health in the Americas, and *Anopheles darlingi* is the main mosquito species which transmits malaria to people in this region. The inability to raise *An. darlingi* as a colony in an insectary under artificial conditions has been one of the major limitations for decades that investigators have faced while examining mosquito behavior, parasite-vector relationships, screening for malaria drug resistance, and testing malaria vaccines. The consistent production of sufficient numbers of *An. darlingi* adult females used in these types of studies is critical for the advancement of malaria research.

The U.S. Naval Medical Research Unit No. Six (NAMRU-6) Entomology Department, led by Cmdr. Frederick Stell, and Dr. Gissella Vasquez, the department's deputy, in collaboration with the National Institute of Public Health of Mexico

(INSP), developed an effective method to establish the first-of-its-kind stable *An. darlingi* laboratory colony at the lab's Insectary in Iquitos, Peru.

The effort began with discussions at the annual meeting of The American Society of Tropical Medicine and Hygiene (ASTM&H) in 2012, Vasquez discovered that other New World anopheline mosquitoes had been successfully colonized by Dr. Cuauhtemoc Villarreal, a senior entomologist at the INSP. In 2013, NAMRU-6 initiated a collaboration with Villarreal, and by exchanging skills and expertise has successfully built a sustainable colony through 14 generations so far.

The first generation bred from several hundred field-collected mosquitoes resulted in the production of over 115,000 laboratory reared adults through successive generations which represents a major and

unique accomplishment for DoD medical entomology research.

"The success of this initiative speaks to the hard work and dedication of our professional team of biologists and technicians in the Entomology Department both in Callao and Iquitos," said Stell.

DoD GEIS acknowledges this remarkable effort and will support a new study examining wild-caught and colonized *Anopheles darlingi* populations in experimental huts in Iquitos, an approach that will increase the knowledge of the behavior and surveillance of this Amazonian malaria vector in order to develop effective control measures to reduce the threat of this mosquito transmitting the disease to military and host nation personnel. The NAMRU-6 *An. darlingi* colony is a unique DoD resource for critical malaria research and will provide numerous opportunities for new regional and international collaboration.

Cairo Lab Conducts Workshop to Support Sentinel Surveillance Study for Acute Viral Hepatitis

From NAMRU-3 Public Affairs



Egyptian hospital laboratory trainees at NAMRU-3 for hepatitis diagnostics training with NAMRU-3's Bacterial and Parasitic Disease Research Program staff. Photo by Rafi George.

CAIRO- In Egypt, about one in every 12 people has viral hepatitis, with the highest hepatitis C prevalence worldwide. In response to this serious public health threat, U.S. Naval Medical Research Unit No. Three's (NAMRU-3) Global Disease Detection and Response Program (GDDRP), with funding by CDC and

GEIS, has initiated a collaborative research project with the Egyptian Ministry of Health entitled Sentinel Surveillance for Acute Viral Hepatitis in Egypt.

The initial phase of this multi-year project is to study the risk factors of acute viral hepatitis at four fever hospitals in Cairo,

Alexandria, Menoufia, and Aswan. In collaboration with the Ministry of Health these government hospitals were chosen based on an assessment of the infrastructure and qualifications of the staff to do the training and participate in the research for this study.

As one component in initiating the GDDRP research project, NAMRU-3's Bacterial and Parasitic Disease Research Program (BPDRP)'s Dr. Moustafa Abdel Fadeel and his team of Mohamed Salah and Iman Touni presented a three-day laboratory workshop at NAMRU-3 in December 2013.

Their goal was to prepare the hospital laboratory staff to conduct acute viral hepatitis surveillance.

The first day of the workshop included the four hospital lab directors and eight technicians. On days two and three, the technicians received training on testing samples, running QA/QC, machine calibrations, data interpretation and an introduction on how to report results to the central team of which NAMRU-3 is a member.

"We showed the lab participants how to do the work with proper practices, using up-to-date methods," said Dr. Moustafa Abdel Fadeel. "We educated them on lab safety and how to apply QC. I feel they will be willing to implement what we taught them."

After the training, the participants were given the chemicals, consumables and diagnostic kits needed to perform the testing for the pathogens known for causing viral hepatitis.

"I am very happy about this project because it directly benefits all Egyptians and the entire country," said Abdel Fadeel, "The participants are also excited about the project and we hope they can maintain that spirit of excitement."

Successful EDGE Bioinformatics Capability Demonstration at AFRIMS – Bangkok, Thailand

SILVER SPRING, Md. – Researchers from the Naval Medical Research Center (NMRC), Los Alamos National Laboratory, and the Defense Threat Reduction Agency (DTRA) successfully demonstrated a novel bioinformatic capability to the Armed Forces Research Institute in Medical Sciences (AFRIMS) in Bangkok, Thailand, February 3 to 7, 2014.

The goal of the EDGE program is to provide OCONUS laboratories, like AFRIMS in Bangkok, with tools to analyze complicated biological data sets. This capability may translate to lower costs.

“The Edge Bioinformatic Software package relies entirely on open-source software tools that bioinformatics professionals typically use, but the implementation is unique because we have put them together into pipelines that are very user-friendly for scientists who don’t typically have a lot of bioinformatic and computer science expertise,” said Lt. Cmdr. Vishwesh Mokashi, head of the NMRC Biological Defense Research Directorate’s Genomics Department. “The graphical user interface and case-driven workflows greatly simplify the task of initiating a genome-scale analysis.”

In the course of one week the EDGE team installed a pre-assembled server at the AFRIMS facility in Bangkok, updated software and patches, ran AFRIMS data sets, and demonstrated the capability to different groups within AFRIMS and also the Department of State officials stationed in Thailand.

The EDGE team successfully ran viral sequence data to generate results in as little as 30 minutes.

The EDGE program is being designed to enable trained bioinformaticians in the U.S. to support OCONUS scientists by logging in remotely to help trouble shoot and interpret results of automated analyses that the CONUS labs will perform. This system will allow for enhanced customized data analyses, which overseas laboratory personnel may not currently be set up to do.

“The other great thing about Edge is that it is designed to run with a small footprint in a lab with limited resources,” said Joseph Anderson, lead developer for the Edge project at NMRC. “As compared to a typical computer cluster that a bioinformatics team might utilize, the machine running Edge is relatively inexpensive, small, and portable. Essentially, wherever you go, you can take a CONUS bioinformatics capability with you. It’s a genomics force multiplier.”

After this successful demonstration, the EDGE team will continue development of the software package, focusing on various aspects such as additional analysis workflows for complex samples such as clinical specimens and improvement of the user interface. They will continue to work with potential users to ensure that pipelines developed are in line with users’ needs.



The goal of the EDGE program is to provide OCONUS laboratories, like AFRIMS in Bangkok, with tools to analyze complicated biological data sets. This capability may translate to lower costs. Lt. Cmdr. Vishwesh Mokaski, head of the NMRC BDRD Genomics Department (standing) led the team.

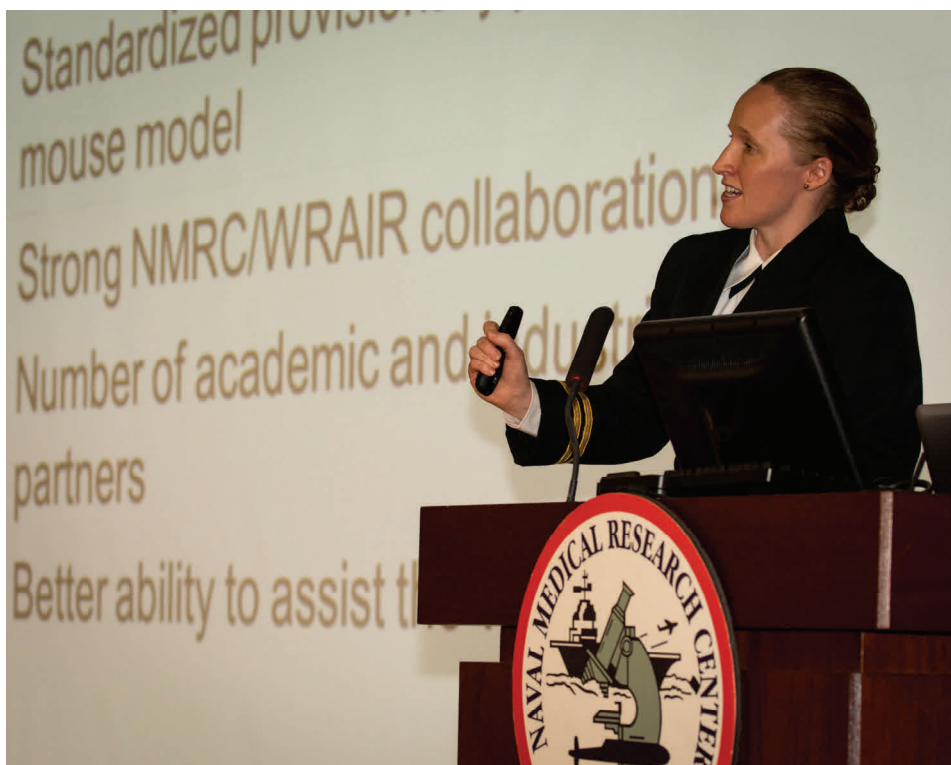
Researcher Discusses Novel Murine Wound Model at Seminar

SILVER SPRING, Md. – Lt. Rebecca Pavlicek, highlighted a current collaborative research effort on a novel murine wound model during a seminar at the Naval Medical Research Center (NMRC), February 21. The NMRC research team in the Wound Infections Department, along with their colleagues from the Walter Reed Army Institute of Research and academic and industrial partners, developed a provisionally patented animal model to evaluate potential treatments for *Acinetobacter baumannii* infection.

Patients recovering from traumatic injuries or surgeries often require prolonged hospitalization increasing the risk for wound and surgical site infection. *A. baumannii* is one of the top reported infections in the Wounded Warrior population and the sixth most reported hospital acquired infection in the community with multi-drug resistance becoming a serious problem.

As new therapies are being developed to counter infections, new more standardized models are needed to evaluate these potential treatments.

"Our team is evaluating infections caused by multiple bacterial species. This model can be used to evaluate antimicrobials for their ability to reduce specific pathogen loads in skin and soft tissue infections as well as study their ability to clear



Lt. Rebecca Pavlicek, highlighted a current collaborative research efforts on a novel murine wound model during a seminar at the Naval Medical Research Center (NMRC), February 21. Photo by Mikelle D. Smith.

biofilms," said Pavlicek. "We hope this novel approach for treatment evaluation will be a first step in the development of novel therapeutics against *A. baumannii* and other infectious agents. At the end of the day it is allowing us to better assist the Warfighter."

The NMRC Wound Infections Department was established in 2011 to develop and evaluate novel and alternative treatment strategies for skin and soft tissue infections associated with multidrug-resistant organisms.

Navy Medicine Highlights Commitment to Global Partnerships

(Continued from page 3)

surveillance efforts in Cambodia, some of which is lead by NAMRU-2 PP.

"The work being conducted here by U.S. and Cambodian researchers is not only important for the health of Americans and Cambodians, but everyone in this region," said Nathan. "We do this not thinking of ourselves but it's for that child, out in the province, who hasn't been born yet that will grow up to live a happier, healthier, longer life."

At a dinner reception hosted by Todd, the

Navy's "top doc" got more opportunities to discuss the current state of military medical research and reiterated his full support for the continued success of the U.S. - Cambodian partnership.

"The visit of the Navy Surgeon General highlights the commitment of the U.S. government for health sector development in Cambodia," said Todd.

Nathan also spent some time at a NAMRU-2 PP field study site in Kampong Cham Province, and was given a firsthand look at how subjects are enrolled and interviewed.

NAMRU-2 PP field staff, led by Malen Ly, provided a tour of the village and a summary of the work being conducted in the province as well as life in rural Cambodia.

NAMRU-2 PP conducts research and surveillance of infectious diseases of military and public health importance in Southeast Asia. NAMRU-2 PP researchers partner with regional governments, international health organizations and U.S. government agencies to build capacity, detect, mitigate and control infectious disease.

Researchers look for Organic Contaminants in Dental Wastewater

SAN ANTONIO – As part of an ongoing effort to improve environmental stewardship and compliance, the Naval Medical Research Unit San Antonio (NAMRU-SA) is studying the performance and efficiency of the Navy-patented chairside dental wastewater filtering system with a special focus on accumulation of organic chemical contaminants, including Bisphenol A (BPA). BPA is a synthetic compound included in the manufacture of polycarbonate plastics and epoxy resins, and is found in many dental composites including resin cements and some dental pit and fissure sealants.

“The placement and removal of dental restorations may result in the release of BPA and other organic chemical

contaminants into the wastewater stream where the environmental impact is uncertain,” said Cmdr. David Leal, head of the Biomaterial and Environmental Surveillance team.

According to Leal and his team, there is limited research in the release of organic chemical contaminants generated by placement and removal of dental resin restorations into dental wastewater.

The efficiency of the Navy’s chairside dental wastewater polypropylene filter will be tested for its ability to remove BPA and other organic contaminants.

“This filtration device already efficiently removes ninety-five percent of mercury,” said Leal.

Contaminant levels from filter extracts will be quantified using Liquid

Chromatography/Mass Spectrometry, a highly sensitive, sophisticated analytical technique which combines the separation capabilities of liquid chromatography with mass spectrometry analysis capabilities.

“This research will further enhance the development of better engineered filtration models to alleviate potential organic environmental contaminants, putting NAMRU-SA at the forefront of global environmental conservation initiatives,” said Leal.

This project will enhance scientific capabilities and engineering practices conducted at NAMRU-SA, while fostering major contributions to the health and safety of our Sailors and Marines.



Cmdr. David Leal (right), head of the NAMRU-SA Biomaterial and Environmental Surveillance Team observes as Dr. Yoon Hwang demonstrates the features of LC/MS to detect BPA in dental wastewater.

From Green to Blue; NAMRU-6 Veterinary Specialist Accepted Into Competitive Navy Officer Commissioning Program

LIMA, Peru – The U.S. Naval Medical Research Unit No. Six (NAMRU-6) is a world leader in vaccine development for protection against diseases that negatively impact the warfighting mission such as travelers' diarrhea or malaria. One aspect of this work is the NAMRU-6 animal facility, an Association for Assessment and Accreditation of Laboratory Animal Care certified facility, overseen by a U.S. Army veterinarian and enlisted veterinary specialist. For NAMRU-6 the work of Staff Sgt. Jared Schaefer, the veterinary specialist, is mission critical as many vaccines for humans begin their life cycle in an animal model.

In addition to work, Schaefer has been busy with school and in 2013 he completed his Bachelors degree with distinction and

opted to apply for a Navy Commissioning program called the Health Services Collegiate Program (HSCP), under the Health Care Administration (HCA) track. The HSCP is a competitive scholarship program designed to provide incentives for students in the HCA field to complete degree requirements prior to obtaining a commission in the Medical Service Corps.

In early February, NAMRU-6 learned Schaefer was accepted into this highly selective program. He will start his Masters in Health Care Administration (MHA) at Texas A&M University, College Station this Fall. Upon graduation he will be commissioned as a Lieutenant Junior Grade and serve at an MTF (Military Treatment Facility), FMF (Fleet Marine

Force) or Shipboard for his first assignment.

NAMRU-6 Commanding Officer, Capt. Kyle Petersen said, "SSG Schaefer is a top tier enlisted member, one of the best I've ever worked with in 20 years. His professionalism, dedication to the mission and knowledge and creative thinking are exemplary and an asset to the command. I am very excited for him for achieving this outstanding professional milestone in his career and proud to be able to call him shipmate in the near future."

Schaeffer is not alone in reaching this milestone. Lt. Carlo Traverso, current NAMRU-6 Director for Administration entered the Navy via the HSCP in 2007 as well, after serving honorably in the U.S. Army as an enlisted Infantry rifleman.



SSG Jared Schaefer completed his Bachelors degree with distinction and opted to apply for a Navy Commissioning program called the Health Services Collegiate Program (HSCP), under the Health Care Administration (HCA) track.

San Antonio Lab Gains Capabilities with New Spectrometers

From NAMRU-SA's Biomaterial and Environmental Surveillance team

SAN ANTONIO – The Naval Medical Research Unit San Antonio (NAMRU-SA) is enhancing the lab's environmental analytical capabilities with the installment of a state-of-the-art Atomic Absorbance spectrophotometer (AA), and a High Performance Liquid Chromatography Triple Quadrupole Mass Spectrometer (LC/MS/MS).

“These new instruments will provide NAMRU-SA with the enhanced capability to identify various elements and molecules in multiple ongoing and future research areas that focus on ways to enhance the health, safety, performance, and operational readiness of our Sailors and Marines,” said Cmdr. David Leal, head of NAMRU-SA's Biomaterial and Environmental Surveillance team.

The AA will detect and characterize metals, including mercury, in dental

wastewater even at very low concentrations.

“The ability to detect mercury at the subpart per billion levels will ensure the Navy successfully meets the EPA requirements and continues to be the leader in environmental stewardship for mercury abatement within our dental treatment facilities,” said Leal.

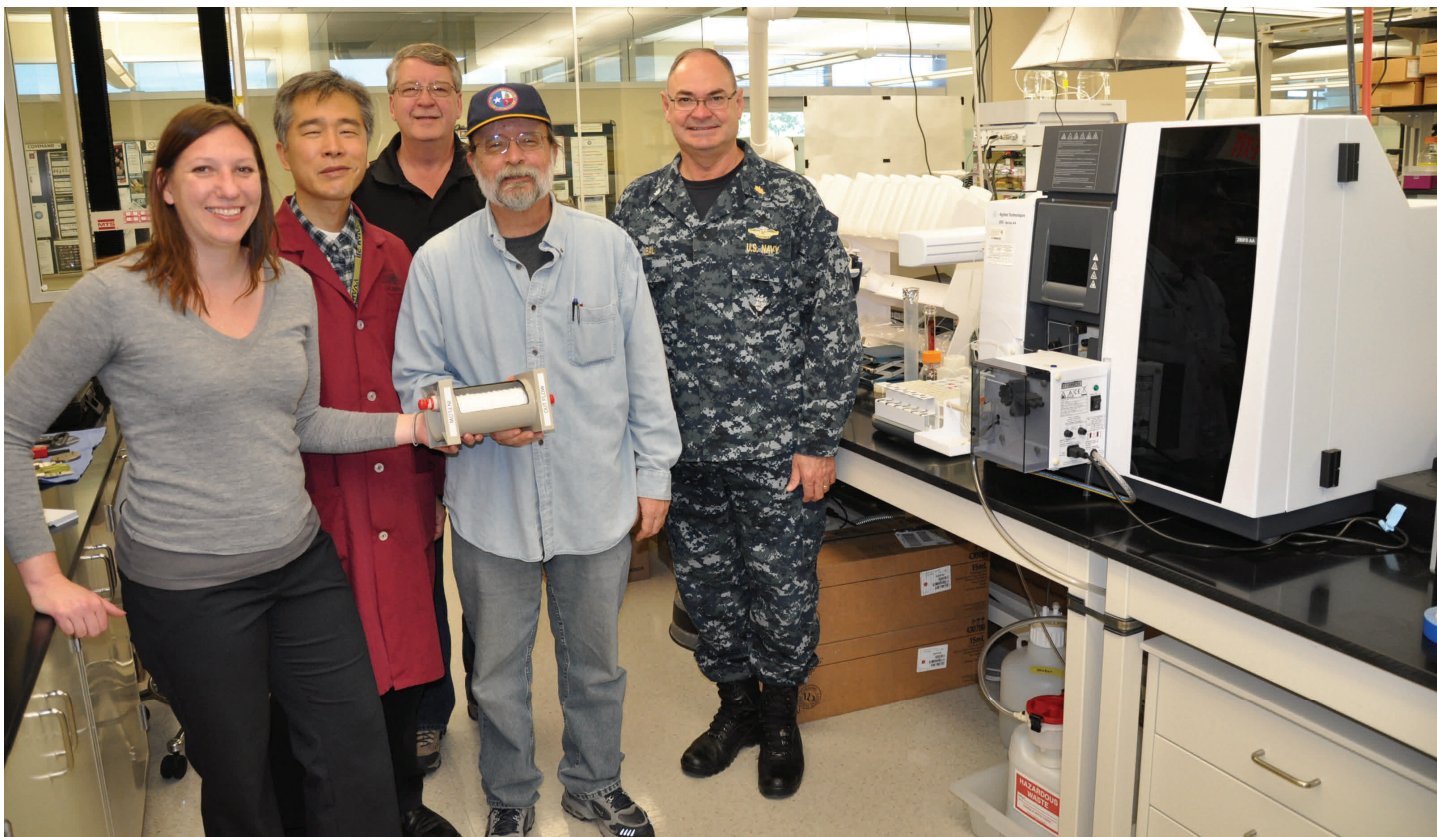
In addition, the AA can quantify silver, iron, arsenic, selenium, and a range of other hydride-forming elements. The AA can also be used to determine metal concentrations in nanoparticle formulations.

The LC/MS/MS can characterize molecules present in dental wastewater at extremely low concentrations.

“The LC/MS/MS also allows us to understand the molecular state of a

substance,” said Leal. “The characterization of a molecule is of even greater importance than simply a basic analysis of the metals present. For example, metallic mercury is fairly safe, and when bound with other metals in amalgam, is practically inert. The organic form of mercury, such as the compound found in fish is very toxic. The ability to analyze a range of substances at ultra-low concentrations provides opportunities to evaluate current remediation techniques or to determine potentially harmful environmental conditions prior to escalation to toxic levels.”

This instrument also measures biomarkers, growth factors, toxin, pesticides and much more in human tissues and in environmental samples.



The NAMRU-SA Biomaterials and Environmental Surveillance team demonstrate the features of the Atomic Absorption spectrophotometer which is used for quantifying metal amounts retained by the DD2011 amalgam separator and in dental wastewater. From left: Dr. Amber Nagy, Dr. Yoon Hwang, Donald Hatcher, Normal Barsalou, and Dept. Head, Cmdr. David Leal.

NMRC Researcher Part of the First NICBR Exploring Careers in Science Symposium for Local Teachers

SILVER SPRING, Md. - Cmdr. Guillermo Pimentel, deputy director of the Naval Medical Research Center's Biological Defense Research Directorate, shared his story of fifteen years as a Navy microbiologist with more than 80 science teachers and administrators of the Frederick County, Maryland Public School system. Pimentel, was one of many scientists from thirteen research agencies located at Ft. Detrick, in Frederick, Md. to participate in the program, February 18.

Highlighting his educational pathway beginning with Saint Louis Academy in Lajas, Puerto Rico, to Washington State University and beyond he focused on his decision points as a student and a Sailor to help the teachers and administrations help students who are thinking about a career in science.

"It was like *'Back to The Future'* again. While preparing my slides I asked myself, if I had the opportunity to start my undergraduate degree again, what would I

do differently? What courses would I take? When would I start conducting my undergraduate research activities? Would I go for a Ph.D. or just stay with a MS? I realized that yes, I would get a PhD. I would broaden my course selection to include basic courses in business, accounting and management!" said Pimentel. "After 15 years of being a scientist for the Navy, I learned that science is an extremely competitive field with the deepest challenge being obtaining long-term funding to conduct research and managing a program. Military scientists need to apply business principles on a daily basis to succeed and carry out their mission."

He pointed out that life as a Navy microbiologist is the best job in the world. Comparing his military career with fellow Ph.D. students and colleagues in the private and public sector, joining the Navy as a scientist was the best decision.

"New Ph.D.'s have multiple student loans and securing a permanent job is extremely difficult. Most likely the first real job is as a post-doc with limited benefits and low salaries. It will take them three to four years to secure job stability with good benefits," said Pimentel. "By joining the Navy, I had the opportunity to be trained as a clinical microbiologist; conduct disease surveillance in CENTCOM, EUCOM and AFRICOM AOR's and use 'soft power' as a way to carry the mission forward."

This event was a great opportunity for local teachers to learn more about how to assist Frederick county students achieve their dreams of becoming scientists.

Educators also learned firsthand that Frederick has a research workforce conducting important research projects for the well-being of the Nation and our deployed forces.

The event was hosted by the National Interagency Confederation for Biological Research (NICBR).



Cmdr. Guillermo Pimentel, deputy director of the Naval Medical Research Center's Biological Defense Research Directorate, shared his story of fifteen years as a Navy microbiologist with more than 80 science teachers and administrators of the Frederick County, Maryland Public School system.

Researcher Studies Environmental Method to Control Sand Fly Populations

From NAMRU-3 Public Affairs

CAIRO- Dr. Rania Kaldas, a scientist at the U.S. Naval Medical Research Unit No. Three (NAMRU-3), successfully identified a method to study sand flies and Leishmania using ecological biochemistry.

Kaldas, from the Vector Biology Research Program (VBRP) combined work done in the lab with research done from her master's degree program concerning sand flies and the Leishmania parasite.

"According to the World Health Organization, Leishmania is an emerging and uncontrolled parasitic disease," said Kaldas, a 2013 graduate of Ain Shams University in Cairo. "This neglected disease has very few available control tools or medical treatments. Carried by *Phlebotomus papatasi* sand flies, which are found in North Africa and the Middle East, Leishmania (*major*) has been found among the Multinational Force and Observers troops in the Sinai."

In coordination with the Multinational Force and Observers, NAMRU-3 has been working for several years on sand fly issues where troops are stationed.

Sand flies are tiny, silent nocturnal insects that hide in confined spaces. Many people do not take preventive measures to avoid getting bitten.

Kaldas, a botanist, theorized that habitat modification might prove to be useful in controlling sand flies near human dwellings.

To combat the inflated sand fly population, Kaldas investigated the rationale for introducing certain plants into the environment which may cause high mortality rates of sand flies.



NAMRU-3's Vector Biology Research Program's Rania Kaldas examines crude plant extract after drying in order to make serial dilutions to monitor effect on leishmania culture. Photo by Rafi George.

Kaldas conducted experiments on sand flies in the insectary which required her to investigate life history traits where she changed the source of their diet to leaves of the castor bean, a native Egyptian plant, and bougainvillea, which is widely planted as shade and decoration.

In nature sand flies look for sugar meals from the plants and suck the sap during development.

Kaldas found that when sand flies fed on the leaves there was a significant decrease in the number of larvae, pupae and adult sand flies.

Chemical substances in the plants cause different reactions in the flies which

affected their development and the viability of the Leishmania parasite.

Cultivating Egyptian plants to control sand flies is an environmentally friendly method that uses natural plant defenses to contain sand flies and their parasites.

Introducing these plants into the environment is a promising control strategy for the service members stationed in the Sinai.

"This is a perfect example of a NAMRU-3 research project that benefits as well as assists in the development of our junior researchers," said Lt. Joseph DiClaro, the Head of VBRP.

VBRP hopes to apply Ms. Kaldas' project in a real life application in the near future.

R & D Chronicles:

Navy Blood Research in Vietnam

By Andre. B. Sobocinski, Historian, Bureau of Medicine and Surgery.

“At that time, the Army was very adamant that the simplest way to provide blood products was to use what they called the ‘walking blood bank.’ The Navy, however, was unique. It had ships and deployments where it would be difficult to maintain a walking blood bank.”

~C. Robert Valeri, Navy Blood Research Pioneer

Transporting and preservation of blood has always been an issue of great importance for the U.S. armed forces. And although great advances have been seen in the

collection, preservation and transportation of blood to the battlefield, the issue of the blood's 21-day shelf life remained a Gordian Knot waiting to be broken for much of the twentieth century.

During the Vietnam War, the Naval Station Hospital Danang and other medical facilities in theater required huge volumes of fresh blood for battle casualties. From January to June 1966, the Navy medical personnel at Danang treated some 944 casualties, one third required blood transfusions of an average 7.5 units. Access to fresh blood was primarily an issue of limited shelf life versus limited supply. Between the collection and transportation, it could take as many as 18 days to get blood through the system leaving a window of just three days before it became outdated.

A world away from Southeast Asia, Navy scientists at the Naval Blood Research Laboratory (NBRL) in Chelsea, Mass. were developing new methods for breaking through this blood barrier. In 1965, NBRL under the direction of Capt. C. Robert Valeri, MC, USN, pioneered a cryopreservation process for preserving and storing red blood cells and platelets for use on battlefields. Donated blood would be refined and placed in a centrifuge where platelets, plasma and red blood cell concentrate would be separated. The red blood cells would then be immersed in the preservative glycerol and then shipped to the theater.

The Station Hospital Danang would be the test bed for NBRL's frozen blood product. In 1966, NBRL shipped its first unit of

(Continued on page 18)



Lt. Cmdr. Edna E. McCormick, MSC, U.S. Navy, and Chief Hospital Corpsman H.E. Williams reconstituting frozen blood aboard USS Repose (AH-16), 1967. BUMED Archives.

NAMRU-3 Assists in Establishing Integrated Disease Surveillance in Sudan

From NAMRU-3 Public Affairs

CAIRO- In conjunction with the World Health Organization (WHO), U.S. Naval Medical Research Unit No. Three's (NAMRU-3) Dr. Hoda Mansour participated in a collaborative mission conducting lab assessments in Sudan.

In accordance with international health regulations, WHO's goal is to establish Integrated Disease Surveillance and Response (IDSR) in Sudan.

Mansour, from NAMRU-3's Global Disease and Detection Response Program (GDDRP) said, "Poor funding distribution and lack of communication among various public health entities, along with difficulties in data collection and mobilization of resources throughout the country signaled the need for this WHO assessment."

"While some public health pillars such as TB, polio, and HIV are already well established, other pillars such as neglected tropical diseases are not effectively integrated into the public health system," added Mansour.

Mansour also assisted with an epidemiology assessment during the visit working with WHO's lead consultant, epidemiologist Dr. Scott McNabb.

During Mansour's visit in February she toured Khartoum national level bacterial, malaria, HIV and polio laboratories, as well as Khartoum's state level laboratory. The goal there was to use WHO facilities standardized lab assessment tool to identify the gaps on four components related to surveillance.

"Sudanese Ministry of Health personnel that worked with NAMRU-3 teams in the past on WHO-supported projects, such as influenza training and biological cabinet repair, appreciated NAMRU-3's continued support," said Mansour.

The assessment identified the need for strengthened communication and interaction between the labs and the national surveillance unit. Additionally, it identified essential improvements in sample management, the Laboratory Quality Management System, as well as biosafety and biosecurity.

Sudanese National Public Health Laboratory staff were excited to use the standardized assessment tool and plan to complete all components of the assessment with remote support from GDDRP.

Navy Blood Research in Vietnam

(Continued from page 17)

frozen blood cells and plasma to Danang where it was stored in the U.S. military's first combat frozen blood bank.

Over the next three years, Danang would spearhead a feasibility study of the frozen blood product ultimately using over 2,000 units.

Technicians would thaw the product, washing away the glycerol through a dilutional process, and preparing it for transfusions. The process itself could take as little as 25 minutes.

Lt. Gerald Moss, MC, USN, who served at Danang overseeing the feasibility of frozen blood would remark, "The study progressed and very quickly the surgeon and anesthesiologist preferred using the frozen red blood cells when they were available because they were a known quantity. We knew they were pristine cells, no plasma, no white cells, no antibodies."



Frozen Blood Bank—Navy Blood laboratory trailer, ca. 1960s.

NMRC Sailors visit Museum, Celebrate African American History



From Left to Right: Lt. Rebecca Pavlicek, Lt. Kim Edgel, Lt. Danett Bishop, HM1 LaTanya Brown, HM3 Jed Merriweather

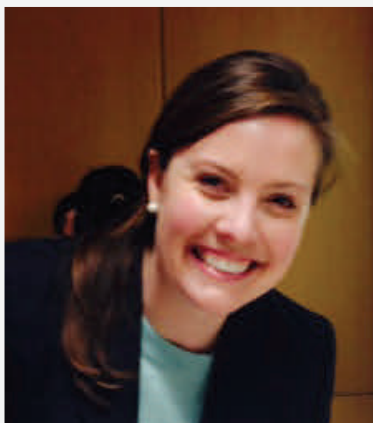
SILVER SPRING, Md. - A group of Sailors from the Naval Medical Research Center visited the National Museum of American History in Washington, D.C. to learn more about the Civil Rights Movement, Feb. 21. The group attended the Historic Theater presentation highlighting the student sit-ins at the Greensboro Lunch Counter. A speaker, portraying a student during the 1960's, provided background information as the audience learned about the attitudes of segregation at the time. Then the speaker invited four people from the audience to role play how the participants of actual sit-ins must have felt while being taunted and tormented.

Following the theater experience, the group explored the exhibit "Changing America: The Emancipation Proclamation, 1863, and the March on Washington, 1963." The exhibit included the Narrative of Frederick Douglass; Abraham Lincoln's emancipation speech and top hat; the Butler Medal, an honor to be awarded to African-American soldiers; and the Sibley tent occupied by some of the first African-American soldiers. The exhibit also highlighted the Marian Anderson Concert of 1939, the Prayer Pilgrimage of 1957, and the March on Washington in 1963.

Greetings from the NMRC Ombudsman!

I love March even though it's such a tease. Sometimes it wants to still be winter, but then you have glorious days of sunshine sprinkled in between. It's maddening, but exciting at the same time because you know that Spring is right around the corner. Unfortunately, so is Tax Day. April 15 is the official day, so if you haven't filed your taxes yet, you still have some time. Luckily, the Navy offers free tax preparation to active duty military and their families through the Volunteer Income Tax Assistance/Electronic Filing (VITA/ELF) program. Navy tax assistance centers are located at Region Legal Service Offices (RLSOs), some Fleet and Family Service centers, as well as select fleet units afloat and around the world. Tax assistance centers in the U.S. will stay open until the file deadline. Service members assigned overseas automatically receive a two-month extension to file their taxes, but that doesn't mean that if you are assigned to an overseas command that you should wait! A complete list of tax assistance centers, as well as, other tax preparation information is located on the Navy JAG website: <http://1.usa.gov/P9VHRT>. This time of year is also a good time to do a little financial spring cleaning. While doing your taxes, take some time to go over your budget or spending plan, savings goals, and insurance coverage. Look out for hidden costs by making sure you know where your money is going - not just the bills you pay every month, but also your every day expenditures. Those afternoon lattes can add

up if they're not in your budget. Now is also a good time to set some savings goals for summer travel or next year's Christmas presents. Putting away a little money each month now can pay dividends in the future. Finally, take a look at your insurance to make sure you are adequately covered. Review your car, home or renters, and personal property insurance to make sure that all of your high value items are declared. For good pointers on how to estimate the value of your property, State Farm offers a good checklist: <http://bit.ly/1cCdE6c>.



From my Navy family to yours,
Have a happy Spring and a great Navy day!
Allison Norris
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